

WHAT IS CLAIMED IS:

1. A plurality of magnetic memory cells, comprising:  
a first magnetic layer shared by the plurality of magnetic memory cells; and  
a plurality of second magnetic layers, each of which corresponds to a separate one of the plurality of magnetic memory cells;  
wherein the first magnetic layer comprises a plurality of domain wall traps formed at predetermined intervals between the magnetic memory cells.
2. The plurality of magnetic memory cells of Claim 1, wherein the domain wall traps comprise regions of the first magnetic layer having a narrower width than the remainder of the first magnetic layer.
3. The plurality of magnetic memory cells of Claim 2, wherein the width of the narrow regions of the first magnetic layer falls within the range of about 25 % to about 85 % of the width of the remainder of the first magnetic layer.
4. The plurality of magnetic memory cells of Claim 2, wherein the narrow regions of the first magnetic layer are created by forming notches along only a single side of the first magnetic layer.
5. The plurality of magnetic memory cells of Claim 1, wherein a domain wall trap is formed between each pair of consecutive magnetic memory cells.
6. The plurality of magnetic memory cells of Claim 1, wherein multiple magnetic memory cells are formed between each pair of consecutive domain wall traps.
7. The plurality of magnetic memory cells of Claim 1, wherein the first magnetic layer comprises a plurality of sublayers comprising tantalum, nickel-iron, magnesium oxide, irridium-manganese, platinum-manganese, nickel-mangenese, and/or cobalt-iron.
8. The plurality of magnetic memory cells of Claim 1, wherein the second magnetic layers comprise a plurality of sublayers comprising tantalum, tungsten nitride, nickel-iron, cobalt, and/or copper.
9. The plurality of magnetic memory cells of Claim 1, wherein the magnetic memory cells comprise tunneling magnetoresistance (TMR) memory cells.

10. The plurality of magnetic memory cells of Claim 9, further comprising one or more barrier layers located between the first magnetic layer and the plurality of second magnetic layers within the plurality of magnetic memory cells.

11. The plurality of magnetic memory cells of Claim 10, wherein the one or more barrier layers comprise aluminum oxide.

12. The plurality of magnetic memory cells of Claim 1, wherein the magnetic memory cells comprise giant magnetoresistance (GMR) memory cells.

13. An MRAM device comprising:

a magnetic layer common to a plurality of magnetic memory cells,

wherein the magnetic layer is configured to prevent the formation of a magnetic domain wall within a region of the magnetic layer corresponding to a given memory cell.

14. The MRAM device of Claim 13, wherein the width of the magnetic layer narrows at predetermined intervals along the length of the magnetic layer.

15. The MRAM device of Claim 14, wherein the width of the narrow portions of the magnetic layer falls within the range of about 25 % to about 85 % of the width of the remainder of the magnetic layer.

16. The MRAM device of Claim 13, wherein the magnetic layer comprises a pinned layer.

17. The MRAM device of Claim 13, wherein the magnetic layer comprises a plurality of sublayers comprising tantalum, nickel-iron, magnesium oxide, irridium-manganese, platinum-manganese, nickel-mangenese, and/or cobalt-iron.

18. A method of forming an MRAM device, comprising:

forming a first magnetic layer on a substrate, the first magnetic layer having a plurality of magnetic domains separated by a plurality of magnetic domain walls, wherein a plurality of domain wall traps are formed at predetermined intervals within the first magnetic layer; and

exposing the first magnetic layer to a magnetic field, thereby rearranging the magnetic domains within the first magnetic layer such that each magnetic domain wall is located within a domain wall trap.

19. The method of Claim 18, wherein the strength of the magnetic field falls within the range of about 1 T to about 2 T.

20. The method of Claim 18, further comprising:

forming a plurality of magnetic memory cells on the substrate, each magnetic memory cell comprising a second magnetic layer and a region of the first magnetic layer,

wherein the regions of the first magnetic layer corresponding to the magnetic memory cells are free of magnetic domain walls.

21. The method of Claim 18, wherein the domain wall traps are formed within the first magnetic layer by narrowing the width of the first magnetic layer at periodic intervals along the length of the first magnetic layer.